

$$\begin{aligned} > d := 10; & & d := 10 & (1) \end{aligned}$$

$$\begin{aligned} > c := 10; & & c := 10 & (2) \end{aligned}$$

$$\begin{aligned} > Ll := 4; & & Ll := 4 & (3) \end{aligned}$$

$$\begin{aligned} > Ri := \frac{d}{2} + Ll; & & Ri := 9 & (4) \end{aligned}$$

$$\begin{aligned} > Rf := c + \frac{d}{2} + Ll; & & Rf := 19 & (5) \end{aligned}$$

$$\begin{aligned} > R := (\beta) \rightarrow Ri + \left(\frac{2 \cdot \beta \cdot (Rf - Ri)}{\pi} \right); & & R := \beta \mapsto Ri + \frac{2 \beta (Rf - Ri)}{\pi} & (6) \end{aligned}$$

$$\begin{aligned} > rmax := (\theta) \rightarrow \frac{((2 \cdot Ll \cdot \cos(\theta)) + (\text{sqrt}(d^2 - 2 \cdot (Ll)^2 + 2 \cdot (Ll)^2 \cos(2 \cdot \theta))))}{2}; & & & \\ & & rmax := \theta \mapsto \frac{(2 \cdot Ll) \cdot \cos(\theta)}{2} + \frac{\sqrt{d^2 - 2 Ll^2 + 2 Ll^2 \cos(2 \theta)}}{2} & (7) \end{aligned}$$

$$\begin{aligned} > Rmax := (\theta, \beta) \rightarrow \frac{rmax(\theta) \cdot R(\beta)}{Ri}; & & Rmax := (\theta, \beta) \mapsto \frac{rmax(\theta) R(\beta)}{Ri} & (8) \end{aligned}$$

$$\begin{aligned} > Vm := (\beta) \rightarrow \frac{1}{\int_0^{2 \cdot \pi} \int_0^{Rmax(\theta, \beta)} \left(1 - \frac{r^2}{(Rmax(\theta, \beta))^2} \right) \cdot r dr d\theta}; & & & \\ & & Vm := \beta \mapsto \frac{1}{\int_0^{2 \pi} \int_0^{Rmax(\theta, \beta)} \left(1 - \frac{r^2}{Rmax(\theta, \beta)^2} \right) r dr d\theta} & (9) \end{aligned}$$

$$\begin{aligned} > VB := (r, \theta, \beta) \rightarrow Vm(\beta) \cdot \left(1 - \frac{r^2}{(Rmax(\theta, \beta))^2} \right) & & & \\ & & VB := (r, \theta, \beta) \mapsto Vm(\beta) \left(1 - \frac{r^2}{Rmax(\theta, \beta)^2} \right) & (10) \end{aligned}$$

$$\begin{aligned} > de1 := (r \cdot (Rf - r \cdot \cos(\theta)) \cdot \text{diff}(Vr(r, \theta, \beta), r)) + ((Rf - 2 \cdot r \cdot \cos(\theta)) \cdot Vr(r, \theta, \beta)) + (r \cdot \text{diff}(VB(r, \theta, \beta), \beta)) = 0; \end{aligned}$$

$$\begin{aligned}
de1 := & r(19 - r \cos(\theta)) \left(\frac{\partial}{\partial r} Vr(r, \theta, \beta) \right) + (19 - 2r \cos(\theta)) Vr(r, \theta, \beta) + r \left(\right. \\
& \left. \frac{26.26245080 \left(1 - \frac{81 r^2}{\left(4.000000000 \cos(\theta) + \sqrt{17 + 8 \cos(2\theta)} \right)^2 \left(9 + \frac{20\beta}{\pi} \right)^2 \right)}{\left(9. + 6.366197724 \beta \right)^3} \right) \\
& + (6682.979721 r^2) \left/ \left(\left(9. + 6.366197724 \beta \right)^2 \left(4.000000000 \cos(\theta) + \sqrt{17 + 8 \cos(2\theta)} \right)^2 \left(9 \right. \right. \right. \\
& \left. \left. \left. + \frac{20\beta}{\pi} \right)^3 \pi \right) \right) = 0
\end{aligned}
\tag{11}$$

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> dsolve( {de1, Vr(Rmax(theta, beta), theta, beta) = 0}, Vr(r, theta, beta));
Error, (in dsolve) unexpected occurrence of the variables {beta,
theta} in the 1st operand of Vr((1/9)*(4*cos(theta)+(17+8*cos(2*
theta))^(1/2))*(9+20*beta/Pi), theta, beta) in the given initial
conditions
>

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